In the Specification:

Please replace paragraphs [0028], [0031], [0034], [0038], [0041] - [0045], [0049], [0050], [0055], [0057], [0059], [0060], [0062], [0064], and [0065] with the following amended paragraphs.

[0028] A back end ~~150~~ 108 is provided for housing various support utilities (not shown) needed for operation of the system 100. Examples of such utilities include a gas panel, a power distribution panel, and power generators. The system can be adapted to accommodate various processes and supporting chamber hardware such as CVD, PVD and etch. The embodiment described below will be directed to a system employing a 300 mm APF deposition chamber. However, it is to be understood that other processes and chamber configurations are contemplated by the present invention.

[0031] Each of the processing regions 218, 220 also preferably includes a gas distribution assembly 208 disposed through a chamber lid 204 to deliver gases into the processing regions 218, 220. The gas distribution assembly 208 of each processing region normally includes a gas inlet passage 240 which delivers gas into a shower head assembly 242. The showerhead assembly 242 is comprised of an annular base plate 248 having a blocker plate 244 disposed intermediate a face plate 246. The showerhead assembly 242 includes a plurality of nozzles (shown schematically at 248 in Figure 3) through which gaseous mixtures are injected during processing. The nozzles 248 direct gas, e.g. propylene and argon, downward over a substrate, thereby depositing an amorphous carbon film. An RF (radio frequency) feedthrough provides a bias potential to the showerhead assembly 242 to facilitate generation of a plasma between the face plate 246 of the showerhead assembly 242 and the heater pedestal 228. During a plasma-enhanced chemical vapor deposition process, the pedestal 228 may serve as a cathode for generating the RF bias within the chamber walls 202. The cathode is electrically coupled to an electrode power supply to generate a capacitive electric field in the deposition chamber 200. Typically an RF voltage is applied to the cathode while the chamber body 202 is electrically grounded. Power applied to the

pedestal 228 creates a substrate bias in the form of a negative voltage on the upper surface of the substrate. This negative voltage is used to attract ions from the plasma formed in the chamber 200 to the upper surface of the substrate. The capacitive electric field forms a bias which accelerates inductively formed plasma species toward the substrate to provide a more vertically oriented anisotropic ~~filming of the substrate during~~ deposition, and a more vertically oriented anisotropic etching of the substrate during cleaning.

[0034] Figure 4 presents a perspective view of a portion of a deposition chamber 400. The deposition chamber 400 includes a process kit 40 of the present invention, in one embodiment. A chamber body 402 is provided to define a substrate processing region 404, and for supporting various liners of the process kit 40. A wafer slit 406 is seen in the chamber body 402, defining a wafer pass through slit. In this manner, a substrate may be selectively moved into and out of the chamber 400. A substrate is not shown within the hollow chamber. The slit 406 is selectively opened and closed by a gate apparatus (not shown). The gate apparatus is supported by the chamber ~~wall~~ body 402. The gate isolates the chamber environment during substrate processing.

[0038] A substrate is not shown within the ~~hollow chamber~~ processing region 404. However, it is understood that a substrate is supported within the ~~hollow chamber~~ processing region 404 on a pedestal, such as pedestal 228 of Figure 2. The pedestal is supported by a shaft that extends through opening 407 in the bottom portion 409 of the body 402. In addition, it is understood that a gas processing system (not shown in FIG. 5) is provided for the chamber 400. An opening 478 is provided in the illustrative chamber 400 for receiving a gas conduit. The conduit delivers gas to gas box (seen at 472 in Figure 7). From there, gas is delivered into the ~~chamber~~ processing region 404.

[0041] Figure 7 provides an exploded view of a chamber body portion 400. In this instance, the chamber body 400 represents a tandem processing chamber. An example is the Producer S chamber manufactured by Applied Materials, Inc. Various parts of a process kit 40 are seen arising from the processing ~~area~~ region 404 on the right side of the body 402.

[0042] The first item of equipment seen in the view of Figure 7 is a top cover 470. The top cover 470 is centrally located within the processing ~~area~~ region 404, and protrudes through the chamber lid (not seen). The top cover 470 serves as a plate to support certain gas delivery equipment. This equipment includes a gas box 472 which receives gas through a gas supply conduit (not seen). (The conduit is inserted through opening 478 in the bottom 409 of the chamber body 402, as seen in Figure 5). The gas box 472 feeds gas into a gas input 476. The gas input 476 defines an arm that extends over to the center of the top cover 470. In this way, processing and cleaning gases may be introduced centrally into the processing ~~area~~ region 404 above the substrate.

[0043] An RF power is supplied to the gas box 472. This serves to generate plasma from the processing gases. A constant voltage gradient 474 is disposed between the gas box 472 and the gas input 476. The constant voltage gradient 474, or "CVG," controls the power level as the gas moves from the gas box 472 towards the grounded pedestal within the processing ~~area~~ region 404.

[0044] Immediately below the top cover 470 is a blocker plate 480. The blocker plate 480 defines a plate concentrically placed below the top cover 470. The blocker plate 480 includes a plurality of bolt holes 482. The bolt holes 482 serve as a through-opening through which screws or other connectors may be placed for securing the blocker plate 480 to the top cover 470. A spacing is selected between the blocker plate 480 and the top cover 470. Gas is distributed in this spacing during processing, and then delivered through the blocker plate 480 by means of a plurality of perforations 484. In this way, processing gases may be evenly delivered into the processing ~~area~~ region 404 of the chamber 400. The blocker plate 480 also provides a high pressure drop for gases as they are diffused.

[0045] Below the blocker plate 480 is a shower head 490. The shower head 490 is concentrically placed below the top cover 470. The shower head 490 includes a plurality of nozzles (not seen) for directing gases downward onto the substrate (not seen). A face plate 496 and isolator ring 498 are secured to the shower head 490. The isolator ring ~~490~~ 498 electrically isolates the shower head 490 from the chamber body

402. The isolator ring 498 is preferably fabricated from a smooth and relatively heat resistant material, such as Teflon or ceramic.

[0049] Returning to Figure [[4]] 5, the chamber 400 next comprises a circumferential channel liner 420. In the arrangement of Figure 7, the liner 420 has a profile of an inverted "C". In addition, the liner 420 includes a channel portion 422. For these reasons, the liner 420 is designated as a "C-channel liner." The inverted "C" configuration is seen more clearly in the enlarged cross sectional view of Figure 6B.

[0050] Looking again at Figure 6B, the C-channel liner 420 has an upper arm 421, a lower arm 423, and an intermediate inner body 422. The upper arm 421 has an upper shoulder 424 formed therein. The upper shoulder 424 is configured to receive the upper lip 414 of the pumping liner 410. At the same time, the lower arm 423 is configured to receive the lower shoulder 416 of the top liner 410. This interlocking arrangement between the top liner 410 and the C-channel liner 420 provides a circuitous interface that substantially reduces unwanted parasitic pumping. In this way, as gases are exhausted from the processing ~~area~~ region 404 of the chamber 400 and through the pumping holes 412 of the pumping liner 410, gas is preferentially evacuated through the channel portion 422 of the C-channel liner 420, and is not lost at the interfaces between the top liner 410 and the C-channel liner 420.

[0055] Referring back to Figure 7, a middle liner 440 is next disposed below the C-channel liner 420. The middle liner 440 resides in the process ~~area~~ region 404 at the level of the slit 432. It can be seen from Figure 7 that the middle liner 440 is a C-shaped liner, and is not circular. The open area in the middle liner 440 is configured to receive wafers as they are imported into the process chamber 400. The middle liner 440 can be partially seen in both Figure 6A and Figure 6B, residing below the C-channel liner 420 and the top liner 410.

[0057] ~~It should be noted at this point that it is within the scope of the present invention to utilize a~~ A process kit ~~wherein~~ may contain selected liners which are integral to one another. For example, the middle liner 440 could be integrally formed with the bottom liner 450. Similarly, the top liner 410 could be integral to the C-channel

liner 420. However, it again is preferred that the various liners, e.g., liners 410, 420, 440 and 450 be separate. This substantially reduces the risk of cracking induced by thermal expansion during heating processes. The employment of a separate but interlocking pumping liner 410 and C-channel liner 420 provides an improved and novel arrangement for a process chamber process kit.

[0059] It is noted that the filler member 430, like the middle liner 440, is not completely circumferential. In this respect, an open portion is retained in the filler member 430 to provide fluid communication between the two process ~~chambers~~ regions 404. The pressure equalization port liner 436 controls the fluid communication between the two process ~~areas~~ regions 404 by defining a sized orifice. The presence of the pressure equalization port liner 436 insures that pressures between the two process ~~areas~~ regions 404 remain the same.

[0060] It is also noted at this point that the filler member 430, the pressure equalization port liner 436, and the upper 442 and lower 444 pumping port liners are preferably coated with a highly smoothed material. An example is a shiny aluminum coating. Other materials provided with a very smooth surface, e.g., less than 15 ~~Ar~~ Ra (roughness average) help reduce deposition accumulating on the surfaces. Such smooth materials may be polished aluminum, polymer coating, Teflon, ceramics and quartz.

[0062] It is preferred that during a deposition or etching process, the processing ~~areas~~ regions 404 be heated. To this end, a heater (not shown) is provided with the pedestal for supporting wafers. A heater pedestal is seen at 462 in the chamber arrangement 400 of Figure 7. It is particularly preferred that the heater be actuated to temperatures in excess of 110° C during a plasma cleaning process. Alternatively, it is possible to use ozone as the cleaning gas, as ozone does not require plasma to disassociate. In instances where ozone is not used, it is particularly desirable to heat the chamber body, thereby increasing the cleaning rate.

[0064] It is understood that the AFP™ chamber 400 of Figure 7 is illustrative, and that the improvements of the present invention are viable in any deposition chamber

capable of performing PECVD. Thus, other embodiments of the inventions may be provided. For example, the pumping liner 410 may have an inner diameter that is smaller than the inner diameter of the C-channel liner 420. This reduced dimension for the top pumping liner 410 serves to reduce the inner diameter of the pumping port 405, thereby increasing velocity of gases moving out of the ~~inner chamber~~ processing region 404 and through the pumping port 405. Increased gas velocity is desirable, as it reduces opportunities for ~~carbonaceous~~ carbon containing residue buildup on chamber surfaces. It is also desirable that the liners be fabricated from a material having a highly smooth surface. This serves to reduce amorphous carbon deposition from accumulating on the surface. Examples of such material again include polished aluminum, polymer coating, Teflon, ceramics, and quartz.

[0065] It is also noted that carbon containing deposits ~~builds~~ build up on colder surfaces faster than on warmer surfaces. Because of this phenomenon, carbon containing deposits ~~tends~~ tend to preferentially build up on the pumping system associated with the deposition chamber. The pumping systems are preferably heated to a temperature greater than 80º C to reduce preferential build-up. Alternatively, or in addition, a cold trap can be integrated into the pumping system to collect unreacted carbon containing precursors and carbon containing ~~by-product~~ byproducts. The cold trap can be cleaned or replaced at regular maintenance intervals.